I. *A Letter from his Excellency* Nicolas-Michael d'Aragona, *Prince of* Caſſano, *and* F. R. S. *to the* Preſident *of the* ROYAL SOCIETY, *containing an Account of the Eruption of* Veſuvius *in* May 1737. *Tranſlated from the* Italian *by T. S.* M. D. *F. R. S.*

SIR,

AS your extraordinary Talents, and excellent Taſte, in a true Examination of Natural Effects, and in Diſcoveries relating to Experimental Philoſophy, are ſo well known, that you have, with Juſtice, been elected into the moſt celebrated Academies of *Europe*, and to the Preſidentſhip of the ROYAL SOCIETY of *London* in particular; I reſolved, with good Reaſon, to offer you a ſhort Account of the laſt great, dreadful and pernicious Eruption of our *Veſuvius*; to the End that, if you are pleaſed to inveſtigate the Cauſes thereof, the Republic of Letters might reap ſome general Advantage, as it does daily, by means of its Members of the firſt Rank in Merit.

Mount *Veſuvius* is generally eſteem'd about ſeven Miles diſtant from *Naples*. It riſes in the Middle of a large Plain, which ſurrounds it on every Side. It is better than four Miles from the Sea; and the Foot of the Mountain is ſeen to begin from the Sea-Coaſt, which growing gradually higher, reaches the firſt Plain, to which one can eaſily ride on Horſeback. The Figure of the Plain is almoſt circular, being about five Miles in Diameter, and half a Mile

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perpendicular Heighth above the Level of the Sea. This is the Baſis of the Mountain, out of which ariſes another, called by the People of the Country *Monte-vecchio*, whoſe perpendicular Heighth is about four hundred Paces, and its Top little leſs than two Miles in Circumference, of an irregular Figure. The ſaid Top, before the Year 1631. was of the Form of a Baſon, but all ſurrounded with aged Oaks, and vaſtly large Cheſtnut-trees, whoſe Fruit afforded Food ſufficient for a Number of Cattle that fed thereon. In the Bottom a Cavern was obſerved, into which People deſcended above two hundred Paces, by difficult and interrupted Paths; and this Opening was looked upon as the antient Mouth, which for a long Space of Time had conſtantly caſt up great Quantities of bituminous Matter, and had at the ſame time burnt a conſiderable Part of the neighbouring Country, cultivated by the Inhabitants round the Hill.

Concerning the Eruptions that have happened heretofore, they are very numerous, as well antient as modern.

Of the firſt, ſeveral are taken Notice of by *Beroſus Chaldæus*, *Polybius*, *Strabo* in the time of *Auguſtus*, *Diodorus*, and *Vitruvius*; and in *Trajan's* Reign the Name of the Mountain became more famous by the Death of *Pliny*. From that time forward, 'tis not doubted, that the Eruptions were leſs frequent down to the Year 1139; when, after a conſiderable Eruption, it began to take Reſt, and continued quiet ſomewhat leſs than five Centuries; ſo that the horrid Remembrance of the paſt Ruins was pretty well obliterated out of the Minds of the neigh-

neighbouring Inhabitants; who, vainly flattering themſelves with Hopes, that the inflammable Matter was ſpent, planted the whole Diſtrict round the Mountain, which, by its Fertility, became the Delight of theſe Parts. But, in Proceſs of Time, they found themſelves deceived and fruſtrated in their Expectations: For in the Year 1631. during ſix Months Space, continual Rumblings were heard, and Shocks of Earthquakes felt: And afterwards, in the Month of *December*, a dreadful fiery Eruption happen'd, which firſt blew up Part of the Mountain into the Air, in a terrible Manner, and then vomited out Water, Aſhes, Stones and Fire; inundating almoſt the whole Country around, to the Sea, and for above ſeven Miles in Breadth, with the irreparable Loſs of more than four thouſand People. After which the Mountain became ſilent, and remain'd conſiderably diminiſh'd in its Heighth, from what it had been before.

It continued quiet for twenty-nine Years; but having rekindled in 1660. its Fire fill'd the whole Capacity of the immenſe Hollow, which remain'd ſince the Year 1631; whence, after ſeveral leſſer Eruptions, a new Mountain appear'd in 1685.

In 1707. not only the Inhabitants of the Neighbourhood, but alſo the whole City of *Naples*, were put into great Terror, and not without Reaſon, by the Apprehenſions of a Renewal of the diſmal Tragedy of 1631. upon account of the frequent Noiſe and Shocks, the Fire ſeen on the Top of the Mountain, with a vaſt Quantity of Aſhes, which iſſuing out with Impetuoſity, were diſperſed all over our Hemiſphere, and darken'd the Light of the Sun for one whole Day's Space. Theſe were all manifeſt Signs of the impending Deſolation: and yet (whether by a Miracle of our particular Protector St. *Januarius*, as ſome were of Opinion, or by natural Cauſes) this dreadful Day, which had portended ſo much Miſchief, was beyond Expectation, and to our great Aſtoniſhment, follow'd by another as pleaſant as could be deſired: for the Air was quite ſerene, and clear of the Aſhes; and on the Mountain there was no other Appearance but that of a little Smoke.

In the Year 1724. the Quantity of Aſhes and Stones, thrown from the Top of the Mountain, were ſo heaped from the Bottom up to the Edge of the old Mountain, that the whole Space from the old Hill to the new, appeared but one continued Mountain.

In 1730. there was another Eruption of *Veſuvius*, which, though very inconſiderable in reſpect of the laſt, yet was the Occaſion of much Fear.

This preſent Year 1737, to the Month of *May*, the Mountain was never quiet: Sometimes emitting great Quantities of Smoak, at other times red-hot Stones; which, for want of a ſufficient impelling Force, fell on the ſame Mountain. But in order to a clear Idea of all the Circumſtances preſaging the impending Eruption, 'tis requiſite to know, that in the Beginning of *May*, a Smoak only was ſeen to iſſue from the open Mouth at the Top; and from the 16th to the 19th, ſubterraneous rumbling Noiſes were heard.

On the 19th, Fire was ſeen to burſt out in thick black Clouds; and the ſame Day there were ſeveral loud Reports, returning quicker towards the Evening:

ing: And ſtill more on *Sunday* Night, when there conſtantly appear'd a very great Smoak mix'd with Aſhes and Stones; and the Neighbourhood felt ſome Shocks, like thoſe of a weak Earthquake.

On *Monday* the 20th, at the 13th Hour, the Mountain made ſo loud an Exploſion, that the Shock was ſtrongly felt not only in the Neighbourhood, but alſo in the Cities twelve Miles round. Black Smoak, intermixt with Aſhes, was ſeen ſuddenly to riſe in vaſt curling Globes; which ſpread wider, as it moved farther from the Baſon. The Exploſions continued very loud and frequent all this Day, ſhooting up very large Stones through the thick Smoak and Aſhes, about a Mile high, to the Horror of the Beholders, and Danger of all the neighbouring Buildings.

At the 24th Hour of the ſame *Monday* 20th of *May*, amidſt the Noiſe, and dreadful Shocks, the Mountain burſt on the firſt Plain, a Mile diſtant obliquely from the Summit, and there iſſued from the new Opening a vaſt large Torrent of Fire; whence, by the Quantity of Fire inceſſantly thrown up into the Air, at a Diſtance all the South Side of the Mountain ſeem'd in a Flame. The liquid Torrent flow'd out of the new Vent, rolling along the Plain underneath, which is above a Mile long, and near four Miles broad; and in its Way it ſpread very ſpeedily near a Mile wide; and by the fourth Hour of the Night, it reached the End of the Plain, and to the Foot of the low Hills ſituate to the South. But as theſe Hills are rugged with Rocks, the greateſt Part of the Torrent ran down the Declivities between theſe Rocks, and into two Valleys; falling ſuc-

ſucceſſively into the other Plain, which forms the Baſis of the Mountain; and after uniting there, it divided into four leſſer Torrents, one of which ſtopp'd in the Middle of the Road, a Mile and half diſtant from the *Torre del Greco*. The ſecond flow'd into a large Valley. The third ended under the *Torre del Greco*, near the Sea; and the fourth at a ſmall Diſtance from the new Mouth.

The Torrent which flowed into the Valley, ran as far as between the Church of the *Carmelites* and that of *the Souls of Purgatory*, by the 8th Hour on *Tueſday*. The Matter of the Torrent ran like melted Lead: In eight Hours it made four Miles; and conſequently, it flowed half a Mile in an Hour: A new and remarkable Circumſtance of this Eruption, ſeeing *Bulifone* thought it very ſtrange, that in the Eruption of 1698. the Torrent had advanced ſixty Paces in an Hour; whence he infers, that ſuch great Swiftneſs proceeded from a greater Degree of Liquation of the Matter. The Trees, which the Torrent light on in its way, upon the firſt Touch took Fire, and fell under the Weight of the Matter.

The Torrent which ran behind the Convent of the *Carmelites*, after ſetting the little Door of the Church on Fire, entered not only therein, but alſo through the Windows of the Veſtry, and into two other Chambers. In the Refectory, it burnt the Windows; and, what is ſurpriſing, the Glaſs Veſſels, that ſtood on the Tables, were melted into a Paſte by the violent Heat of the Fire. Sixteen Days afterwards, the Matter continued hot, and was very hard, but it was broke by repeated Blows.

A Piece of Glaſs faſten'd on the Top of a Pole (and thruſt into this Matter) was in four Minutes reduced to a Paſte. Under the Maſs of the Torrent were heard frequent Reports, which made the Church ſhake, as if by an Earthquake. Along the whole Surface of the Torrent, there appear'd ſmall Fiſſures, out of which iſſued Smoak, that ſtunk of Brimſtone mix'd with Sea-water; yet theſe Exhalations are not poiſonous, but rather a Remedy for ſome Diſeaſes. The Stones round about theſe Fiſſures were obſerved to be covered with ſublimed Salts, the Nature of which I ſhall explain hereafter.

Iron, thruſt into theſe Fiſſures, was taken out moiſt; but upon thruſting in Paper, it was not moiſten'd, but rather ſomewhat harden'd.

At the ſame time when the new Mouth open'd, that on the Summit of the Mountain vomited a vaſt Quantity of burning Matter, which, dividing into Torrents, and ſmall Streams, ran partly towards the *Salvadore*, and partly towards *Ottajano*; and at the ſame time that this Matter iſſued out, red-hot Stones were ſeen to be caſt out of the Mouth, in the midſt of black Smoak, frequent Flaſhes of Lightning and Thunder, all produced by the ſame Matter.

Theſe impetuous Expulſions of Fire continued till *Tueſday*, when the Eruption of the melted Matter, the Flaſhes, and thundering Noiſe, ceaſed; but a ſtrong South-weſt Wind ariſing, the Aſhes were carried in great Quantities to the utmoſt Boundaries of the Kingdom; in ſome Places very fine, in others as coarſe as *Iſchian* Sand: And in the Neighbourhood they not only felt this plentiful Shower of Aſhes, but likewiſe Pieces of Pumice-ſtones, and other large Stones.

Tueſday Night the Fury of the Mountain began to abate, ſo that on *Sunday* there was ſcarce any Flame ſeen to break out of the upper Mouth; and on *Monday* but little Smoak and Aſhes. This Day it began to rain plentifully, which continued to *Tueſday*, and afterwards for many Days: A Circumſtance which has conſtantly happen'd after the Eruptions of Times paſt.

The Damages done in the Neighbourhood by this Eruption of Fire and Aſhes, are incredible. At *Ottajano*, ſituate between four and a half and five Miles from *Veſuvius*, the Aſhes on the Ground were four Palms high. All the Trees were burnt, (or blaſted) the People terribly affrighted, and many Houſes cruſhed by the Weight of the Aſhes and Stones that fell.

After the Deſcription of this fiery Eruption, the Academy of Sciences [at *Naples*] thought proper to make an accurate Analyſis of the Matter, and of the Salts, that were collected in great Plenty near the above-mentioned Fiſſures; and, towards the Diſcovery of the Truth, they effectually made the following Experiments:

EXPERIMENT I.

Some of the Stones of *Veſuvius* being pounded ſmall, and the Loadſtone applied to the Powder, ſome few Particles were attracted by it; and the ſame Powder, put into *Aqua-fortis*, cauſed a ſenſible Efferveſcence; whence it certainly contains no ſmall Quantity of Iron: Which was alſo found upon Trial in in another Eruption by *Tomaſo Cornelio.* But for the greater Elucidation of Truth, one of theſe Stones being applied to the Magnetic Needle, it turned to the Stone; and then carrying it round to the oppoſite End of the Needle, it immediately turned from it, in the ſame manner as if Iron was applied near the Compaſs.

EXPERIMENT II.

The Stones are not all of the ſame Denſity or Colour; but various, and of different Ponderoſity. Some are compoſed of real Talc, others full of Marcaſites: Some are almoſt all ſulphureous, others nitroſe; ſome of a grey Colour, others red.

EXPERIMENT III.

The Matter of the Current is ſpongy at Top, but very denſe towards the Bottom; which is a Proof of the Fuſibility thereof; whereby the heavier Bodies ſubſided, and the lighter remained at Top.

EXPERIMENT IV.

After growing hard, it retained part of the Heat above a Month, though unequally: For in the inward Parts, where the Air had not free Acceſs, and the Matter was more compact, the Heat was much ſtronger than towards the Surface.

EXPERIMENT V.

Twenty Days after the Eruption, in divers Parts of the Mountain, from the Bottom to the Top, there were ſeen to ariſe many pernicious Damps, [*Moſete*] eſpecially from the Cavities, and the Fiſſures of former Torrents; as alſo on the Plain: But none were obſerved in the Matter of this laſt Eruption. They iſſued out of the Fiſſures under the Appearance of a cold Wind, and roſe about three Palms high; then they moved along the Surface of the Ground, and, after a Progreſs of ſome Paces, diſappeared. Animals, which happened to graze where theſe paſſed, were all killed thereby; and likewiſe a *Tereſian* Frier, who inadvertently breathed the Vapour of one of theſe Damps.

EXPERIMENT VI.

Having placed the Barometer in the Vapour, it underwent no Change, but the Thermometer fell ſomewhat more or leſs. A lighted Torch, thruſt into them at two Palms from the Ground, was ſoon extinguiſhed by the Action of the Damp.

EXPERIMENT VII.

Theſe Damps grew gradually weaker in their pernicious Effects for above three Months, even to the ſubſequent Autumn; as has been generally found in other former Eruptions, or when they happened to iſſue out of their Vents.

EXPERIMENT VIII.

Concerning the Salts which are generated in Abundance in *Veſuvius*, I have, by Order of the Academy, examined them by accurate Experiments. My Intention was to know, if beſides Salt Ammoniac, there were alſo Sea-Salt, Vitriol, Nitre, or any other Salt. I thought there was no better way of proceeding in this Inquiry, than by Cryſtallization; becauſe it is univerſally allowed, that Salts in Cryſtallizing conſtantly retain one certain and determinate Figure; Sea-Salt concreting into Cubes, Vitriolic Salt into Rhomboidal Parallelepipeds, Alom into Octædrons, and Nitre into Rectangular Priſms on Hexagonal Baſes. I imagined, that if the Salt of *Veſuvius* happened to contain any Particles of the Salts above-mentioned, it would diſcover them after Cryſtallization. This way of Reaſoning was confirm'd by Experiment: For the *Veſuvian* Salt, in Cryſtallizing, left on the Sides of the Veſſels ſmall Parcels of cryſtallized Salts, which, obſerved through a Microſcope, reſembled a Tree with its Branches, on the Ends of which there appeared ſeveral Pyramids of an irregular Figure, but very ſharp-pointed; and between the Branches there were interſperſed in ſome Places a Group of Priſms, in others ſome ſmall Cubes: Whence I inferred, that the aforeſaid Salt was Ammoniacal, and indeed a genuine and efficacious Salt Ammoniac, with inſenſible Portions of Nitre and Sea-Salt. Which coincides with the Sentiments of the Royal Academy of *Paris* in 1705; with thoſe of *Thomas Cornelius* in his *Progymnaſma de Senſibus*; of *Dominicus Gulielmini* in his Treatiſe *de Salibus*; of Dr. *Boerhaave* in his Chemiſtry, and many other Writers.

EXPERIMENT IX.

In order to be convinced whether this Salt was really Ammoniacal, and of the Nature of neutral Salts, I mixed it with Spirit of Vitriol, and Spirit of Salt, without producing the leaſt Fermentation. I afterwards put ſome of it into Oil of Tartar *per Deliquium*, and could not perceive any Ebullition; wherefore it is to be ranked among the neutral Salts.

EXPERIMENT X.

Thrown upon red Coals, it did not crepitate like Sea-Salt, but it boiled and ſwelled, and after evaporating it dried up.

EXPERIMENT XI.

It is of a very pungent Taſte, ſtrongly pricking the Tongue, and of a bituminous Smell of Brimſtone, which occaſions a violent Head-ach by its volatile Texture.

EXPERIMENT XII.

The Salts taken from different Stones are not all of the ſame Weight or Colour: For ſome are yellow and unctuous, as if rubbed all round with *Petrolæum:* Others are very white, others blackiſh, and others of other Colours, according to the Stones they adhered to.

EXPERIMENT XIII.

I have likewiſe found by Experience, that the Salt Ammoniac of *Veſuvius* is much more efficacious than any other Salt known at this Day, in cooling Liquors. Upon diſſolving ſome of it in Water, it makes the Water ſo cold, that the Sides of the Veſſel which contains it, can hardly be touched without Uneaſineſs, through the exceſſive Cold.

EXPERIMENT XIV.

Monſ. *Geoffroy*, a celebrated Member of the Academy of Sciences, looks on it as a ſingular Power of common Salt Ammoniac, that being mixed with a certain Quantity of Water, it rendered the Water ſo cold, that it made the Spirit of his Thermometer, eighteen Inches high, fall thirty-three Lines. But I have ſhewn to ſeveral Perſons, that the *Veſuvian* Salt makes the Liquor of a Thermometer, like his, fall four Inches and an half; which is equal to fifty-four Lines. Wherefore the Efficacy of this Salt, in cauſing the Fall of the Liquor, exceeds the Efficacy of common Salt Ammoniac by twenty-one Lines.

EXPERIMENT XV.

If round a Veſſel full of Water cooled with Snow, there be put ſome of the Salt of *Veſuvius*, the Water freezes and grows hard in a very little time.

EXPERIMENT XVI.

If you put a good Quantity of the Salt of *Veſuvius* into Snow ſet round a [Glaſs] Veſſel full of Water, and then ſtir the Veſſel, the Water contained therein becomes unfit to drink; having acquired a very diſagreeable acrid ſulphureous Taſte; a manifeſt Sign, that the Salt is divided into ſmall Particles, which paſſing through the inſenſible Pores of the Glaſs, enter into and mix with the Water.

EXPERIMENT XVII.

Of all kinds of Salts, this diſſolves in the greateſt Quantity in Water; and perhaps the greater or leſſer

Diſſolubility of a Salt in Water, will be [found] proportional to its greater or leſſer Effect in cooling Water.

EXPERIMENT XVIII.

Being put into Brandy, or Oil, beſides that very little of it is diſſolved, it occaſions no Deſcent of the Liquor in the Thermometer.

EXPERIMENT XIX.

Being mixed with Blood lately drawn from the Vein of a Man, but coagulated after ſettling, the Blood was thereby diſſolved, and continued in that State for the Space of twenty-four Hours.

EXPERIMENT XX.

A Solution [of this Salt] being injected into the Vein of a Dog, firſt occaſioned Tremors, then univerſal Convulſions, and laſtly Death: And four Hours afterwards, having opened the Dog, the Blood, which ſhould have been coagulated, was found fluid, both in the Trunks of the Veins, and at the Ends of the Arteries.

EXPERIMENT XXI.

It has all the Properties of Salt Ammoniac to that Degree, that upon ſubſtituting this *Veſuvian* Salt, inſtead of common Salt Ammoniac, the ſtrongeſt ſort of *Aqua Regia* may be had for diſſolving Gold: Which Experiment was made with Succeſs by Monſ. *Lemery*, in the Academy of *France*.

EXPERIMENT XXII.

If a Lump of the Mineral Matter be reduced to a fine Powder, and attentively viewed through a Microſcope, it appears very like the Sand of *Iſchia*, and is very proper for Writing-Sand: Whence I conjecture, that that Sand is nothing elſe, but the [ſame] Matter for a long time comminuted by the Action of the Sea

EXPERIMENT XXIII.

In ſome of the Stones there appear ſome few Veins of Gold, in others of Silver, but inſenſible; and in others, which are very heavy, there is ſome Antimony.

EXPERIMENT XXIV.

A great Diſpute aroſe in the Academy on the Riſe of the [*Mofete*] Damps; for what Reaſon theſe ſhould be ſeen only in the old *Strata* of the mineral Subſtances, and not in the new, where by the Action of the Fire they ought to iſſue: Which *Phænomenon*, if I am not miſtaken, may be accounted for in this manner: As the cooling of the burning Matter began at the Surface, we may think, that the more ſubtle heterogeneous Particles, upon the cloſing of the Pores at the Surface, remained in Quantities buried in the lower Parts of the Matter; which, in Proceſs of Time, becoming acutangular and of deleterious Figures, yet cannot offend while impriſoned: But in new Eruptions, wherein the Shocks given to the Matter produce many Fiſſures, the Damps, meeting with leſs Reſiſtance there, iſſue forth: As when the Air is a long time pent up in ſome Hollow, upon giving it Vent, it generally comes out in a pernicious Vapour.

EXPERIMENT XXV.

It was obſerved, that the greateſt Shocks happened to ſuch things as ſtood expoſed to the *Volcano*; but that thoſe things which were not thus expoſed to it, received but faint Shocks: A manifeſt Sign, that the Vibration of the Air had a great Share in the Shocks of the Earth: Which Circumſtance is taken Notice of by *Borelli* with reſpect to Mount *Ætna.*

II. *An Abſtract of a Letter from an* Engliſh *Gentleman at* Naples *to his Friend in* London, *containing an Account of the Eruption of Mount* Veſuvius, May 18. *and the following Days*, 1737. *N. S.*

SIR, Dated *Naples*, *Aug.* 30. 1737. *N. S.*

YOU have laid a very hard Task upon me, to ſend you an Account of the late Eruption. * * I was lodged for ſome time at *Chaja*, and afterwards at *Fontina Medina*, in the Face of this ſurpriſing Neighbour [Mount *Veſuvius*], which from thence doth not appear to be above two or three Miles diſtant.

It gave us Strangers conſtant Entertainment, by ſhewing us what it could do, as well as great Satiſfaction to the People of *Naples*, who, whilſt it continues burning more or leſs without ceaſing, are under no